12.47 kV SYSTEM: BLACKBERRY SWITCHING STATION (SW-A6)

EMERGENCY RESPONSE

APPLICATION

For use by Facilities Division electricians. This procedure is part of the operations manual for the 12-KV power system. See ADMN-056 for an overview of the manual's contents, including related procedures.

This procedure should be carried out ONLY by a qualified electrician who has been instructed and trained to work on the 12.47 kV system. Any Facilities personnel performing this procedure must be familiar with the general operating and information procedures regarding this system.

PURPOSE

Response to an emergency at the Blackberry Switching Station.

SCOPE

The following Work Steps are guidelines for addressing conditions in the field.

A. All Blackberry Switching Station emergencies: Use this step to determine which breaker(s) have tripped and to direct you to one of the Work Steps (B through E) in this procedure.

B. Phase Overcurrent (51) for Incoming Breakers.

C. Ground Overcurrent (51N) for Incoming Main Breakers.

D. Phase Time Overcurrent (51) for Feeder Breakers.

E. Ground Overcurrent (50/51G) for Feeder Breakers.

SPECIAL INSTRUCTIONS

Special equipment required:

- High voltage gloves, flash suit, or other protective clothing as required by LBNL Switching Tag;
- LBNL locks and tags.

WORK STEPS

A. All Blackberry Switching Station Emergencies

1. Refer to Diagram 7R0794.
2. **Locate tripped breaker.** Determine which breaker(s) have tripped, then go to the specified section of this procedure.
   a. **IF** incoming line main circuit breaker (52-A601 or 52-A602) trip on PHASE OVERCURRENT (51), **GO TO Section B.**
   b. **IF** incoming line main circuit breaker (52-A601 or 52-A602) trip on GROUND OVERCURRENT (51N), **GO TO Section C.**
   c. **IF** any feeder breaker has tripped OPEN, and there is a PHASE TIME OVERCURRENT relay target (51), this indicates an overload or short circuit condition existed on that particular feeder circuit. **GO TO Section D.**
   d. **IF** a feeder breaker has tripped OPEN on GROUND OVERCURRENT or INSTANTANEOUS element (50/51G), **GO TO Section E.**

B. PHASE OVERCURRENT (51) for Incoming Main Breakers

1. Incoming line main circuit breaker trip (52-A601 or 52-A602):
   a. **IF** there is a 51 relay trip target, check all feeder breakers (52-A604 through 52-A621):
   b. **IF** all feeder breakers are still closed, this indicates an overload condition existed on the 12.47 kV incoming line. **GO TO Step 2.**
   c. **IF** any feeder breaker has tripped OPEN, **AND** there is a phase TIME OVERCURRENT relay target (51), this indicates an overload or short circuit condition existed on that particular feeder circuit. **GO TO Section D.**
2. Record targets:
   a. Note and record the condition of all relay targets in the Switching Station Log.
   b. Provide information for entry into Electric Shop Log as required.
3. Reset the relay targets, ONLY with a Facilities electrical engineer's approval.
4. Open all feeder breakers on the affected bus.

NOTE:
Complete LBNL Switching Tag prior to Step 5.

5. Reclose the incoming line breaker.
   a. **IF** breaker holds, reclose each feeder breaker, one at a time.
      - Note the operating current of each feeder and compare with previously recorded SCADA readings.
   b. **IF** breaker trips, **GO TO Step 6.**
   c. **IF** a sustained overcurrent condition exists, take steps to reduce the load.
6. If circuit breaker trips again:
   a. Note and record relay targets.
   b. Tag the breaker control OFF. Rack out and lock out the breaker.
   c. Troubleshoot the feeder circuits to isolate the problem.
7. Restore power when conditions are cleared.
   - Complete log.

C. GROUND OVERCURRENT (51N) for Incoming Main Breakers

1. Check for incoming line main circuit breaker trip (52-A601 or 52-A602):
   a. **IF** there is a 51N relay trip target, check all feeder breakers (52-A604 through 52-A621)
   b. **IF** there is a feeder GROUND OVERCURRENT relay target (50/51G), this indicates the ground fault condition existed on that particular circuit. **GO TO Step 3.**
   c. **IF** there is NOT a feeder GROUND OVERCURRENT relay target (50/51G), this indicates that a ground fault condition existed in the switchgear, ahead of the feeder ground relays. **GO TO Step 2.**
2. Check for grounds:
   a. Check protective equipment at area switching station or substation for possible indication of ground fault.
   b. **IF** none is found, isolate the feeder cable by opening disconnect device at load end.
   c. **IF** found, repair as required.
3. Remove the feeder breaker.

CAUTION: Unless the incoming line main breaker has been opened, the bus side of the test cart will be energized.

4. Insert test cart.
   - Probe each cable.
5. Hi-pot each load phase cable to locate possible grounded cable.
   a. **IF** grounded cable found, repair as required.
   b. **IF** cable(s) test clear, **GO TO Step 6.**
6. Hi-pot load area equipment and cables for possible grounds.
7. Restore feeder power when grounds are cleared. Complete Log.

D. PHASE TIME OVERCURRENT (51) for Feeder Breakers

1. Check for feeder CIRCUIT BREAKER trip (52-A604 through 52-A621).
2. Check SCADA printout and protective equipment at area switching station or substation for possible indication of overload condition.
3. Record trip target in Log.
4. Reset the relay targets, ONLY with a Facilities electrical engineer's approval.
5. Remove the feeder breaker.

CAUTION:
Unless the incoming line main breaker has been opened, the bus side of the test cart will be energized.

6. Insert test cart.
   - Probe each cable.
7. Hi-pot each load phase cable to locate possible short circuits.
   - Repair as required.
   - **IF** cable(s) test clear, **GO TO Step 8.**
8. Hi-pot load area equipment and cables for possible short circuits.
   - Repair as required.
9. Restore feeder power when circuits are cleared.
   - Complete log.
10. Observe load current for possible overload condition and take steps to reduce load.

E. GROUND OVERCURRENT (50/51G) for Feeder Breakers

1. Check for feeder CIRCUIT BREAKER trip (52-A604 through 52-A621).
2. Check for grounds.
   a. Check protective equipment at area switching station or substation for possible indication of ground fault.
   b. **IF** none is found, isolate the feeder cable by opening disconnect device at load end.
3. Remove the feeder breaker.

CAUTION:
Unless the incoming line breaker has been opened, the bus side of the test cart will be energized.

4. Insert test cart.
   - Probe each cable.
5. Hi-pot each load phase cable to locate possible grounded cable.
   - Repair as required.
   - **IF** cable(s) test clear, **GO TO Step 6.**
6. Hi-pot load area equipment and cables for possible grounds.
   - Repair as required.
7. Restore feeder power when grounds are cleared.
   - Complete Log.

REFERENCES

1. ADMN-056, 12.47 kV System Operations Manual Binder Document Control.
2. Diagram 7R0794: Meter and Relay Diagram for the Blackberry Switching Station3.
3. INFO-048, 12.47kV System: Protective Relays.

RESPONSIBILITIES AND CONTROLS

Completion of the following signature lines constitutes approval of this procedure:

REV NO.	SME	REVIEWED BY	APPROVED BY / DATE	REVISION DATE
3	Elec Shop Supv James Murphy (Print Name)	Chief Elec Eng Lawrence D. Domansky (Print Name)	5/21/07 Utilities Mgr Martin J. Hanson (Print Name)	5/10/07 EMRG-078